2014

Gains from Sharing: Sticky Norms, Endogenous Preferences, and the Economics of Shareable Goods

Anders Fremstad
University of Massachusetts - Amherst

DEPARTMENT OF ECONOMICS

Working Paper

Gains from Sharing: Sticky Norms, Endogenous Preferences, and the Economics of Shareable Goods

by

Anders Fremstad

Working Paper 2014-02

UNIVERSITY OF MASSACHUSETTS AMHERST

Gains from Sharing:

Sticky Norms, Endogenous Preferences, and the Economics of Shareable Goods

Anders Fremstad*

February 19, 2014

Abstract: There are often "gains from sharing" underutilized goods with others. People routinely share tools, media, gear, electronics, toys, space, and vehicles with relatives, friends, and neighbors, and the internet is opening up new opportunities to share them with strangers. Drawing on the work of James Buchanan, Elinor Ostrom, and Yochai Benkler, I develop an economic framework of decentralized sharing. My analysis challenges the implications of simple economic models, which ignore the role of sticky norms and endogenous preferences and, therefore, suggest that people are always sharing at efficient levels. I argue that the online platforms may gradually transform norms and preferences to substantially increase peer-to-peer borrowing and lending. Using data from General Social Survey, the Consumer Expenditure Survey, the online platform NeighborGoods, and my own survey, I estimate the current and potential value of decentralized sharing. I find that today peer-to-peer borrowing is worth at least $179 a year for 30 percent of Americans and at least $774 for 8 percent of Americans. If the online platforms are able to facilitate high levels of sharing among loosely-tied individuals, the annual benefit to the average household would be modest but significant, perhaps one thousand dollars a year. My analysis suggests that that there are significant gains from sharing tools, media, gear, electronics, toys, pets, vacation homes, and lodging, but the largest gains will likely come from sharing privately-owned vehicles.

Keywords: theory of clubs, theory of households, excludable non-rival goods, decentralized cooperation, reciprocity

JEL classifications: D10, D70, Q01

---

* Ph.D. Candidate, Department of Economics, University of Massachusetts – Amherst, afremsta@econs.umass.edu . I would like to thank Nancy Folbre, Arindrajit Dube, Ryan Acton, and James Kitts for their comments on this paper and earlier versions.

1. Introduction

There are "gains from sharing" goods when the cost to the lender is less than the benefit to the borrower. Relatives, friends, and neighbors have historically shared tools, media, gear, electronics, toys, space, and vehicles, and the internet is reducing the transaction costs of decentralized borrowing and lending among strangers. The websites Couchsurfing, NeighborGoods, Sharetribe, and Spotwag provide platforms for people to share goods for free; Airbnb and RelayRides provide new rental markets for people to share lodging and vehicles.

The "sharing economy" has received considerable attention in the mass media, from Rachel Botsman's TED talk on "The Case for Collaborative Consumption", to *The Economist's* March 2013 cover story, to Thomas Friedman's July 20th, 2013 op-ed in the *New York Times*, "Welcome to the Sharing Economy". Researchers are beginning to address the sharing economy as well, and Agyeman, McLaren, and Schaeffer-Borrego (2013) provide a useful review of much of that work. However, economists have largely ignored the issue, perhaps because data on sharing is scarce, perhaps because simple models suggest individuals will always share at efficient levels, and perhaps because notions of limitless economic growth reduced interest in economizing on goods. That is all changing. Online sharing platforms provide new sources of data. Sticky norms and endogenous preferences can lead to inefficient and unstable equilibria. And slow economic growth and heightened concerns over climate change have spurred new interest in economizing on goods.

I begin my analysis of the economics of sharing by reviewing the literature on club goods, household economies, community governance, and decentralized cooperation. James Buchanan's theory of clubs highlights the prevalence of shareable goods, but simple neoclassical models naively suggest that markets will lead individuals to automatically exploit all gains from sharing. Elinor Ostrom explores how communities can efficiently manage common goods, but community governance is not an effective means of sharing privately-owned goods. Yochai Benkler celebrates the power of decentralized sharing, but his enthusiasm warrants a careful economic analysis of the current and potential gains from sharing.

After reviewing the literature, I present a framework for understanding peer-to-peer sharing. The economic benefits from sharing stem from the underutilization of private goods. The costs of sharing are influenced by technology, norms, and preferences. Although online platforms greatly reduce the cost of matching people with goods, our norms and preferences have not fully adjusted to this technological change. Over time, I argue that online networks will develop norms conducive to peer-to-peer sharing and promote preferences for this form of cooperation. The evolution of our sticky norms and endogenous preferences could lead to a substantial increase in

sharing in the years to come. My benefit and cost framework also explains why people share different kinds of goods using different institutions, including libraries, second-hand markets, and online platforms. I argue that further gains from sharing will likely come from institutions that facilitate peer-to-peer borrowing and lending.

Next, I describe my data and methodology for estimating the current value and potential value of decentralized sharing. I use data from the General Social Survey, the Consumer Expenditure Survey, the NeighborGoods network, and my online survey. I estimate current gains from sharing by assigning a value to how often people report borrowing and lending items. I estimate an upper-bound of the potential gains from sharing by calculating household expenditures on a variety of shareable goods. Although my methods cannot measure the social costs and benefits of sharing, they shed light on the magnitude of private benefits.

My results suggest that decentralized sharing is currently worth at least $179 dollars a year to the 30 percent of Americans who borrow an item once a month or more. If new online platforms succeed in fostering substantial borrowing and lending among strangers, the mean household gains from sharing could exceed one thousand dollars annually. Significant gains are most likely to come from sharing tools, media, gear, electronics, toys, pets, vacation homes, and lodging on online platforms. Households may save the most by effectively sharing privately-owned vehicles.

2. Literature review

My review of the literature begins within neoclassical economics. Although some researchers criticize the rationalist, self-interested approaches to understanding sharing (see Belk 2010), I make the case that decentralized sharing may become increasingly important for rational, economic actors. Buchanan and Salcedo *et al.* present models of clubs and households, which suggest that people always share at efficient levels. However, their models ignore how norms and preferences determine the costs of sharing, which weakens their argument that equilibria levels of sharing are efficient or stable. Ostrom argues that individuals may squander common goods, and that communities can govern such goods efficiently. However, the principles for community governance are not met in the case of shareable goods. I draw heavily on Benkler's arguments that decentralized sharing among loosely-connected individuals is viable, pervasive, and increasingly important. Benkler draws on Coase's work on transaction costs, but he overlooks the relevance of Akerlof's work on how asymmetric information can lead to adverse selection. My theoretical and empirical sections build on Benkler's analysis, while tempering his enthusiasm.

Buchanan's groundbreaking 1965 paper, "An Economic Theory of Clubs", highlights the pervasiveness of goods that are neither "purely private" nor "purely public" (Buchanan 1965, 1).

> "As an extreme example, take a good normally considered to be purely private, say, a pair of shoes. Clearly your own utility from a single pair of shoes, per unit of time, depends on the number of other persons who share them with you. Simultaneous physical sharing may not, of course, be possible; only one person can wear the shoes at each particular moment. However, for any finite period of time, sharing is possible, even for such evidently private goods." (Buchanan 1965, 3)

Buchanan ultimately focuses on goods that are commonly shared through clubs, such as golf courses, but his analysis also applies to what I call shareable goods. Like club goods, shareable goods are excludable and fairly non-rival, since people can take turns using them.

Table 1. Taxonomy of Goods

	Excludable	**Non-excludable**
Rival	private goods	common goods
Non-Rival	club goods, shareable goods	public goods

Buchanan assumes that clubs accept new members until the benefit of sharing the expense with the marginal member is offset by the cost of sharing the good with the marginal member (Buchanan 1965, 5). The cost of sharing can be negative in some domains, due to camaraderie (Sandler and Tschirhardt 1980). However, in equilibrium it must cost current members something to share the good with an additional member. (If it did not, a profit-maximizing club would admit an additional member without reducing the fees paid by current members.) The model suggests that the market will guide individuals to share some goods efficiently through clubs. It is fairly straight-forward to generalize Buchanan's idea to peer-to-peer renting. Rational owners should rent underutilized goods to their peers whenever the benefit to the borrower – measured in dollars – exceeds the cost to the lender. From this perspective, the lack of peer-to-peer renting suggests that gains from sharing are rare.

Alejandrina Salcedo, Todd Schoellman, and Michèle Tertilt's 2013 paper "Families as Roommates" makes no reference to Buchanan, but it essentially describes households as clubs. In their model, people live together if the benefit of splitting the expense of household public goods outweighs the time cost of "forming and maintaining relationships" with each of their housemates. (Without such a cost, utility-maximizing individuals would all live in a single, humungous household.) Salcedo *et al.* calibrate their model to fit current data from the Consumer Expenditure Survey (CES), which shows that people with higher incomes tend to live in smaller households and

spend a smaller proportion of their incomes on household public goods. Their calibrated model is consistent with established household equivalency scales. For example, it suggests that the household with two median-income adults is 12 percent better off than their single peers earning the same per-capita income.

Buchanan's theory of clubs and Salcedo *et al.*'s theory of households assume that individuals share goods when the benefits outweigh the costs, which suggests that prevailing levels of sharing are always efficient. Although their models highlight the costs of sharing, they do not address how these costs might change. In fact, after calibrating their model using current CES data, Salcedo *et al.* argue that income growth explains 37 percent of the decline in the number of adults (and 16 percent of the decline in the number of children) in the average household from 1850 until 2000 (Salcedo *et al.* 2013, 153). Their claim rests on the heroic assumption that the amount of time it took to form and maintain relationships with housemates remained constant for one hundred and fifty years, while the opportunity cost of that time increased with wages. However, it seems likely that the costs (and benefits) of sharing changed due to technological innovation and the evolution of norms and preferences. For example, the norms that defined the rights and responsibilities within multi-generational households may have deteriorated over time. Also, preferences against living with non-relatives may have developed endogenously, as children increasingly grew up in single-family households. In short, it is unclear whether prevailing norms and preferences lead individuals to live in households of the optimal size, as the neoclassical theory suggests. It is similarly unclear whether individuals engage in the optimal level of inter-household sharing.

Not all economists are so optimistic that individuals will easily form clubs, households, or other institutions to efficiently share goods. Ostrom argues that enduring institutions for governing common goods are characterized by seven design principles, including clearly defined boundaries, established appropriation rules, and collective participation in setting those rules (Ostrom 1990, 90). When these design principles are present, she argues that communities can be the best institution for allocating common goods; when these principles are absent, community governance fails. Community governance does not provide a solution for allocating shareable goods, because these privately-owned items are dispersed and heterogeneous. It is very costly for a community to set and enforce universal rules governing their use. In decentralized sharing, lenders have greater freedom to set appropriate rules for sharing a particular good with a particular person, but they also have fewer resources for enforcing cooperative behavior.

Benkler, a legal scholar, outlines an alternative to Buchanan and Salcedo *et al.*'s case for markets and Ostrom's case for community governance. His 2004 article "Sharing Nicely: On

Shareable Goods and the Emergence of Sharing as Modality of Economic Production," focuses on environments in which loosely-connected individuals successfully share goods in a decentralized manner.

Benkler highlights the system of "slugging" in Northern Virginia, in which drivers pick up and drop off riders at established locations free of charge. By sharing their rides, "slugs" get a free commute, and "body snatchers" earn the right to drive in High Occupancy Vehicle (HOV) lanes. Slugging emerged organically when HOV lanes were created in the 1970s. Over time, slugs and body snatchers have developed norms that reduce the social cost of sharing, including: first come first served; no talking (unless everyone wants to talk); no payment; no eating; and the slug line does not leave a single woman standing alone at night (Slugging Etiquette).

Another example of decentralized cooperation is SETI@home, a network of millions of personal computers that make up the largest virtual supercomputer in the world (Benkler 2004, 291). SETI@home takes large problems related to the search for extraterrestrial life and breaks them into small parts that can be solved by personal computers. Volunteers contribute to this project by installing a program on their computers that automatically solves these problems when the computer is idle.

These case studies illustrate how decentralized sharing can increase the utilization of private goods – vehicles and computers – at little cost to owners. Benkler contrasts decentralized sharing with Ostrom's notion of community governance. He addresses arguments made by Sam Bowles and Herb Gintis that the community governance works because it provides people with repeat interactions that improve incentives to cooperate, background knowledge about other participants, and rules for enforcing cooperative behavior.

> "'Community governance'… gains robustness because it involves tightly connected social groups. But social sharing is a broader phenomenon, one that includes cooperative enterprises that can be pursued by weakly connected participants or even by total strangers and yet function as a sustainable and substantial modality of economic production. Indeed, in the context of the digitally networked environment, it is this type of sharing and cooperative production among strangers and weakly connected participants that holds the greatest economic promise" (Benkler 2004, 333-4).

Benkler stresses the "fluidity" of participation in slugging and SETI@home. These institutions require a lower level of commitment than community governance. Benkler acknowledges that these forms of cooperation may be less attractive to "communitarians", who prefer the forms of cooperation found in traditional Amish communities or communes. But he contends that this

fluidity makes these decentralized institutions attractive to "many more people" so that they are "likely to be more economically effective and efficient on a larger scale" (Benkler 2004, 343).

Benkler's argument draws heavily on the transaction cost literature spurred by Ronald Coase. There are costs to both market and non-market sharing. Just as it can be less costly to settle disputes using informal norms rather than formal laws (Ellickson 1986, 686), it can be less costly share goods on reciprocal networks rather than peer-to-peer markets (Benkler 2004, 311). Introducing rental fees for shareable goods may reduce sharing. Bruno Frey and Reto Jegen find strong evidence that monetary incentives can crowd-out intrinsic motivation to cooperate (Frey and Jegen 2001, 606). Benkler argues that "social norms may shift around entitlements" to lower the transaction costs of non-market sharing (Benkler 2004, 311), but it is unclear how much and how quickly norms can shift.

Benkler overlooks how George Akerlof's analysis in "The Market for Lemons" relates to cooperation among loosely-connected individuals (Akerlof 1970). Asymmetric information about members of sharing networks may lead to problems of adverse selection. Online platforms may attract uncooperative individuals, who show up late or treat others' goods carelessly. This could lead cooperative individuals to lend lower-value goods or simply leave the network. Akerlof's insight also provides an argument for why networks may have tipping points. If a network can attract enough cooperative users that the problem of uncooperative members becomes insignificant, then even more cooperative individuals may join the network. This process may have worked in reverse in the case of hitchhiking. When hitchhiking was widespread, the threat of interacting with dangerous riders or drivers was very low. However, as participation declined and the problems of adverse selection increased, hitchhiking may have surpassed a tipping point, leading to its collapse in the United States.

Scholarly research suggests that sharing goods is either trivial or revolutionary. In this paper I argue that it lies somewhere in between. Next, I present a theoretical framework for understanding the costs and benefits of sharing gods, followed by an empirical analysis of current and potential gains from peer-to-peer borrowing and lending

3. Theory

Within my framework, the economic benefits of sharing stem from the underutilization of shareable goods, while the costs of sharing are largely social in nature. I stress that the costs and benefits of sharing depend on norms and preferences. Current levels of sharing may not be efficient if sticky norms and endogenous preferences prevent people from exploiting new technologies. There are

many institutions for increasing the lifetime utilization of shareable goods, but my analysis suggests that the greatest gains from sharing will come from decentralized borrowing and lending on online platforms. My framework suggests that the potential value of peer-to-peer sharing could be economically significant, a proposition I test with my empirical work.

3.1. The economic benefits of sharing

By definition, shareable goods are underutilized. Fully-utilized goods are rival and, hence, private goods. The utilization of goods varies greatly, even for very similar goods. Recall Buchanan's example. Formal shoes are quite shareable, because people wear them only on special occasions. Casual shoes are not very shareable, because people tend to wear them every day.

The gains from sharing a good depend not on its utilization over any particular time period, but over its entire lifetime. Some rarely-used goods are fully depreciated by the time they are discarded. We brush our teeth for a few minutes a day, so we could, in principle, share toothbrushes (Frank 2010, 576). However, we generally use toothbrushes until they are worn out, so toothbrushes are not actually underutilized, and there are generally no gains from sharing them (even if we wanted to).

There is little accurate data on the utilization rates of various goods, but existing data suggests that the utilization of many goods is quite low. The average power drill is used between six and twenty minutes *ever* (Steffen 2007). Assuming that these drills could operate for many hours, the relevant utilization rate of privately-owned drills may be less than one percent. The utilization rates of more expensive goods can also be surprisingly low. Average vehicle occupancy in the United States is 1.7 (Santos *et al.* 2011, 33), which means the utilization rate is about 33 percent when private vehicles are in use.[1] Moreover, private vehicles are driven a bit less than one hour a day, or 4 percent of the time (Santos *et al.* 2011, 7, 31). Vehicles would depreciate more rapidly if they were driven more often, but doubling a vehicle's annual mileage does not double its rate of depreciation. The effective lifetime utilization rate of the average privately-owned vehicle may be 25 percent.

The low utilization rates of many shareable goods suggest there are substantial economic gains from sharing. Economists recognize the waste of underutilizing stocks of capital and labor, as measured by capacity utilization and unemployment rates. The underutilization of the stock of shareable goods represents a similar form of waste. Whether or not it is efficient for people to rarely use many of the goods they own depends on the costs of sharing.

[1] Assuming five-seat cars

3.2. The costs of sharing

Both Buchanan and Salcedo *et al.* explicitly recognize the cost of sharing underutilized goods. Some of the costs of sharing are transaction costs: the time it takes to locate a good, arrange to borrow it, pick it up, and drop it off. However, the costs of sharing transcend transaction costs and are largely social in nature. They depend on the level of trust between the borrower and lender, the ability to punish or discourage malfeasance, the clarity of social scripts around sharing, and the value people place on privacy, flexibility and independence. Norms and preferences are important determinants of the cost of sharing.

The key contribution of Buchanan and Salcedo *et al.* to the economics of sharing is that they model both the benefits and the costs. The main shortcoming is that they assume that the costs of sharing are fixed. The internet has substantially reduced the transaction costs associated with locating a shareable good, but people have not instantaneously joined online platforms to share goods. If norms are sticky, it will take time for people develop etiquette for peer-to-peer sharing. If preferences are endogenous, it will take time for people to learn to like sharing on decentralized networks. I argue that sharing is more complex than simple neoclassical models suggest. My framework suggests the internet may still lead to fundamental changes in norms and preferences that sharply reduce the costs of sharing over time.

On the other hand, even if norms and preferences shift over time to facilitate greater sharing, the gains from sharing are limited. The costs will always outweigh the benefits of sharing some underutilized goods. Even if the utilization rate of privately-owned drills is 1 percent, it may be inefficient for one hundred people to share a single drill. However, that does not mean that it is currently efficient for most households to own a private drill that they use for just a few minutes. In wealthy countries, people own many items that they use very rarely. A simplistic neoclassical perspective suggests this must be efficient – why else would they do it? My framework suggests that this large stock of shareable goods provides an opportunity for people to develop norms and preferences that will allow them to exploit untapped gains from sharing.

3.3. Institutions for sharing

Online platforms are just some of the many institutions people use to exploit gains from sharing. I classify these institutions along three dimensions:

- Institutions for transferring ownership and institutions for lending and borrowing
- Institutions for centralized sharing and institutions for decentralized sharing

- Institutions for market sharing and institutions for non-market sharing

Common forms of sharing can be organized in a 2∗2∗2 matrix. Table 2 provides examples of all eight types of institutions, with those that facilitate decentralized borrowing and lending in bold. My analysis of the costs and benefits of sharing provides some insight for why people tend to choose different institutions for sharing different goods in different contexts. The framework also explains why the greatest untapped gains from sharing are likely in decentralized borrowing and lending.

Table 2. Methods of Sharing

	Transferring ownership		Borrowing and lending	
	Centralized	Decentralized	Centralized	Decentralized
Market	thrift stores, pawn shops	high-end garage sales, Craigslist, EBay, Amazon	Tool rental stores Zipcar, Netflix, renttherunway	**RelayRides, Airbnb, Blablacar**
Non-market	free stores, clothing swaps, homemade stuff swaps?	low-end garage sales, passing on clothing, Freecycle, "borrowing" a cup of sugar	public libraries, households, communes	**sharing with friends and neighbors, slugging, SETI@home, Couchsurfing, NeighborGoods**

People transfer ownership over some goods while they borrow and lend others. We avoid borrowing and lending goods when it is prohibitively costly to haul the good back and forth. In general, bulky and frequently-used goods, including furniture and clothing, tend to be sold or gifted, whereas portable and rarely-used items, such as books and drills, tend to be borrowed. In settings with limited trust, it may be preferable for people to transfer full ownership (and residual claimancy) of fragile goods to their new owners, rather than borrow and lend them. The internet has especially reduced the transaction cost of borrowing and lending goods, which require many more transactions than transferring ownership. Online platforms also provide new, if imperfect, mechanisms for building trust among loosely-connected individuals.

Some sharing is centralized, while some sharing is decentralized. Centralized sharing has the advantage of reducing some of the costs of finding a particular good. Institutions that lend out goods also have clear rules that ensure borrowers return items in good condition and protect the institution from liability. However, there are distinct advantages to decentralized sharing. When sharing is decentralized, people may not have to travel as far to borrow a good – it is usually

preferable to borrow a ladder from a neighbor than a rental store. By increasing the utilization of privately-owned goods, decentralized sharing avoids the cost of storing shareable goods. I focus on decentralized sharing, because new technology particularly facilitates peer-to-peer transactions by centralizing information about where goods can be found.

Finally, people share some goods through the market, while they share others at no cost. It is not entirely clear why people often avoid sharing goods on markets. In some cases, the market-clearing price or rental rate may be close to zero (Thomas 2003). In others, the cost of setting rental rates and prices may lead people to share goods for free. Exchanging money may crowd-out intrinsic motivations to share goods (Willer *et al.* 2012). Lending goods for free may also encourage borrowers to treat goods more carefully than they would a rented good, increasing the total gains from sharing. However, rental fees may be key to getting people to borrow and lend valuable goods. This paper's focus on decentralized borrowing and lending includes both market and non-market sharing.

The internet has improved many established institutions for sharing, including libraries, car rental companies, and second-hand markets. But the internet particularly opens up opportunities for decentralized borrowing and lending. The cost of coordinating convenient, reliable, safe, peer-to-peer transactions is declining. The question is whether these new institutions promote norms and preferences that are conducive to borrowing and lending goods on online platforms.

3.4. The sharing economy

A recent surge in websites aim to facilitate decentralized borrowing and lending. Couchsurfing matches guests with hosts. NeighborGoods lets people share underutilized tools, media, and gear. RelayRides facilitates peer-to-peer car rental. The mixed success of these sites provides some support to Benkler's 2004 claim that sharing will become increasingly important in the "digitally networked" economy. It remains to be seen to what extent these platforms can shift norms and preferences to radically increase sharing.

Not all companies associated with the sharing economy aim to increase the utilization of shareable goods. For example, Lyft provides an unregulated taxi service and TaskRabbit an informal labor market. It is also worth noting that, although there are both market and non-market platforms for sharing goods, there are few non-market sites for people to share services without receiving anything in exchange. A survey of users of the Finnish sharing platform, Kassi, found that people were much more eager to share their stuff than share their time (Suhonen *et al.* 2010, 9). This may be because people's time is generally more rival than their shareable goods.

The goal of sharing platforms like CouchSurfing, NeighborGoods, and RelayRides is to facilitate better matches between borrowers and lenders than offline networks of friends, neighbors, and relatives. They aim to get users exactly what they need, precisely when they need it, as conveniently as possible. Online sharing platforms facilitate borrowing and lending in three ways: they organize information about what goods members would like to share, they provide feedback mechanisms that encourage cooperative behavior, and they strengthen preferences for sharing. Organizing information for decentralized borrowing and lending is useful even for sharing among friends, relatives, and neighbors, since it is prohibitively costly to continually inform acquaintances of all items one would like to borrow or lend. Allowing people to leave feedback on the actions of others, and strengthening preferences for borrowing and lending goods, are essential for decentralized sharing among loosely-connected individuals.

Consider how NeighborGoods and Couchsurfing encourage people to share durable goods and lodging with strangers. Members of NeighborGoods post items they would like to share to their inventories and search the local inventories for items they would like to borrow. When members cannot find an item they would like to borrow, they can post it to their wishlist. If someone requests to borrow a certain good, and the lender agrees, NeighborGoods asks the borrower to provide his or her telephone number, describe how he or she would like to use the good, and agree to follow the "three golden rules of sharing: play nice, treat other people's stuff the way you'd want your stuff to be treated, and show up on time." The pair then arranges for the borrower to pick up and drop off the good at a convenient time and place. When the transaction is complete, NeighborGoods asks the lender to rate and comment on the borrower, and the borrower to rate and comment on both the lender and the item. In cases of malicious behavior, members can place a "panic" on alleged offenders, and NeighborGoods retains the right to permanently remove bad actors from its site. (Of course, the site has no way of preventing offenders from setting up another account under a different username).

Couchsurfing similarly organizes information and enforces cooperation to facilitate sharing. In their 2009 paper, "Surfing a Web of Trust", Lauterbach, Truong, Shah, and Adamic analyze anonymous, individual-level data from Couchsurfing. General reciprocity is vital to Couchsurfing, since direct reciprocity is only possible if two members travel to each other's home cities – an unlikely coincidence of wants. However, Lauterbach *et al.* find that 12 to 18 percent of Couchsurfing stays were directly reciprocated between 2004 and 2008, suggesting that Couchsurfing experiences can lead to new friendships (Lauterbach *et al.* 2009, 348).

These online sharing platforms recognize that the costs and benefits of sharing depend critically on sticky norms and endogenous preferences. They promote norms that are conducive to sharing among loosely-connected individuals, such as NeighborGoods' three golden rules encouraging borrowers to be friendly, careful, and punctual. They also encourage people to recognize the endogeneity of preferences. Couchsurfing tells new users, "You have friends all over the world, you just haven't met them yet" (Couchsurfing, How It Works). Friendship is, in a sense, the ultimate endogenous preference. Online sharing platforms have not maximized the benefits or minimized the costs of decentralized sharing, but the plethora of sites ensures steady experimentation as platforms compete for users. This competition is not entirely zero-sum. Promoting cooperative norms and sharing preferences benefits all platforms in the sharing economy.

My framework suggests that the internet may not only reduce the transaction costs of borrowing and lending, but also shift norms and preferences to substantially increase decentralized sharing. Like Benkler, I am optimistic about the prospect of substantially greater sharing in the digital economy. However, theory alone cannot address how economically important decentralized borrowing and lending is today or will be in the future.

4. Data and Methodology

This paper seeks to answer two key empirical questions: How large are the current gains from decentralized sharing? And what are the potential gains from peer-to-peer sharing on online platforms? Data on sharing are limited, leading Benkler to refer to it as the "dark matter of the economic production universe" (Benkler 2004, 337). I draw on four sources: the General Social Survey (GSS), the NeighborGoods network, my own survey, and the Consumer Expenditure Survey (CES). All these data have significant limitations. None offers good measures of the social costs (or benefits) of sharing, so my empirical work focuses on the economic benefits of sharing.

The GSS provides self-reported data on sharing with people in other households. The survey's 2002 and 2004 topical modules on altruism ask respondents how often they performed nine altruistic acts, including how often they "let someone [they] didn't know very well borrow an item of some value like dishes." I pool data from the 2002 and 2004 surveys for a sample of 2,712 people, and I convert the categorical values like "once a month" and "two or three times a year" to annual values following Einolf (2007). Unfortunately, the GSS only asks people how often they share items with someone they don't know very well, whereas most decentralized borrowing and

lending occurs largely within reciprocal networks of friends, neighbors, and relatives. The GSS question misses these transactions.

To address this shortcoming of the GSS question, I designed and conducted my own online survey of NeighborGoods users. My survey consists of eighteen questions and takes about ten minutes to complete. Respondents had a one-in-fifty chance of winning a $100 Amazon gift card "to purchase something you (and your neighbors) need". I ask how often subjects borrow and lend items with people they know well and with people they don't know well. The survey asks users about their motivations and obstacles to sharing goods online. I also collect data on individual and household characteristics. The full survey is in Appendix A. NeighborGoods emailed a link to the survey to 22,000 active and inactive members in August 2013, and 333 people completed the survey, giving me a response rate of 1.5 percent. Although this response rate is low, it is common for surveys of large online communities. For example, Willer *et al.*'s survey of 47,492 Freecycle users achieved a response rate of 1.7 percent (Willer *et al.* 2012, Appendix A).

Table 3. Descriptive statistics of GSS and NeighborGoods samples

	GSS sample				NeighborGoods sample			
Variable	Obs	Mean	Min	Max	Obs	Mean	Min	Max
Gender	2,712	0.51	0	1	324	0.45	0	1
Age	2,700	44.7	18	89	319	41.6	20	81
Household size	2,712	2.74	1	11	323	2.60	1	5
Household income	2,398	59,243	449	204,320	306	84,412	10,000	150,000
Happiness	2,706	2.22	1	3	325	2.22	1	3

Variables definitions: gender (male = 0, female = 1), household size ("5 or more" = 5 for NG sample), household income (based on midpoints, in 2013 dollars), happiness (1 = "not too happy", 2 = "pretty happy", 3 = "very happy"). GSS means are weighted, NeighborGoods means are unweighted.

The NeighborGoods sample is quite similar to the GSS sample. Respondents to my survey include slightly more men, are slightly younger, and live in slightly smaller households, as shown in Table 3. Respondents from the two surveys report nearly identical levels of happiness. The most significant discrepancy between the two samples is that my subjects report a mean household income that is 42 percent larger than GSS respondents. My sample comes disproportionately from wealthier Pacific states (NeighborGoods was launched in California), but re-weighting the sample to reflect the actual regional distribution of the US reduces the income discrepancy by just 1 percent. Part of the income difference may result from how I code the category "$100,000 or more". Re-coding the income category $120,000 instead of $150,000 reduces the discrepancy by about a third. I am forced to conclude that my sample is more affluent than the American population at large. I

suspect that is because people with higher incomes and higher levels of education use the internet more extensively, making them more likely to join NeighborGoods and respond to my online survey.

My survey provides better data on how frequently people borrow and lend goods with people they do know well, but it does not ask respondents to report their gains from sharing each time they borrow a good. Instead, I estimate the average gains from sharing when people borrow items for free using anonymous data from NeighborGoods. I use activity logs from March 2009 to November 2012 that provide information about 14,937 items and 1,281 transactions over this time period. When users add an item to their inventory, NeighborGoods asks them to list its value. Table 4 lists the median and mean value of goods that are posted and goods that are shared. I assume that the items people share on NeighborGoods are similar to the items that people share offline. If anything, the median good shared among their friends, relatives, and neighbors is probably worth more than the typical good shared on NeighborGoods.

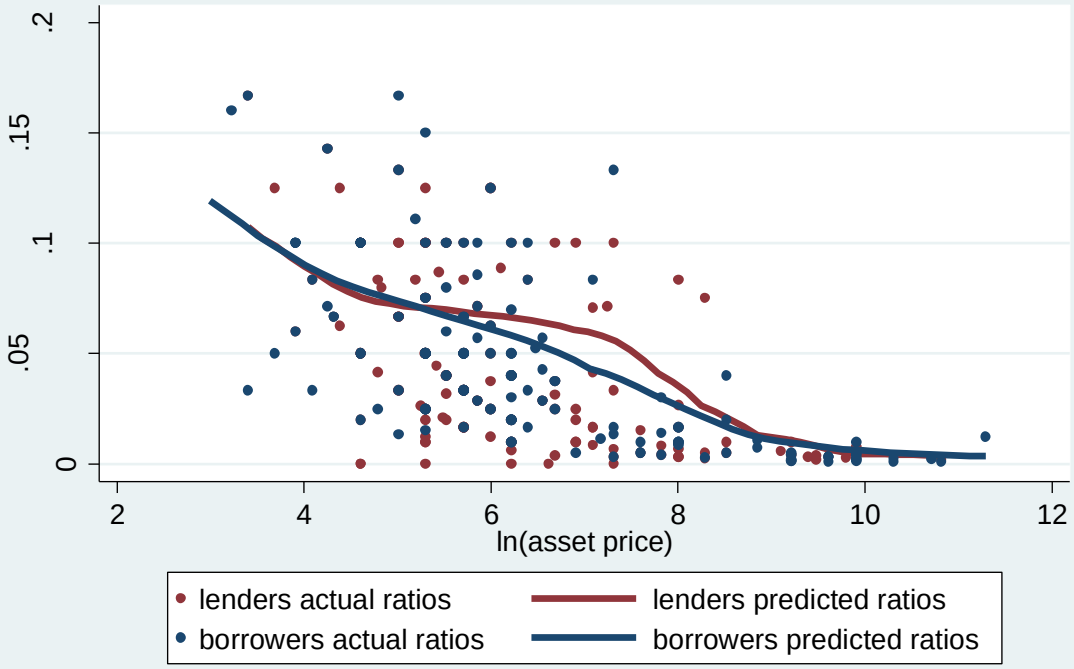
Table 4. Value of items on NeighborGoods

	Obs	**Median value**	**Mean value**
Posted goods	14,863	$60	$214
Shared goods	1,243	$75	$466

The next step is to translate the value of a good into the value of borrowing that good. Economists have lots of data on how much goods cost, but not much data on how much it is worth to use a good for an hour, a day, or a week. Rental markets are very thin for most of the goods that people share with one another, so they do not provide a good measure of the value of borrowing a good for a day. My survey provides a measure of the value of borrowing goods. It asks users if they would "consider sharing more expensive items on NeighborGoods if lenders could charge a fee." Many users worry that allowing fees would undermine the cooperative spirit of the network, but 55 percent of respondents are amenable to the idea. The survey asks those users to list specific goods they would be willing to borrow or lend for a fee, how much the goods are worth, and what rental fees they would be willing to pay or accept. Borrowers and lenders have very similar ideas about the value of sharing. It is worth more to share valuable goods, but the proposed rental/asset price ratios decline as the value of the good increases. The scatter plot in Figure 1 shows the actual rental/asset price ratios that respondents would pay as borrowers and accept as lenders. I use a local polynomial estimator to estimate the rental/asset price ratio for goods of any value. This method allows for a non-linear relationship between the variables, and it provides good estimates

of the ratios near the endpoints. My predicted ratios suggest that people are willing to pay 9.4 percent of the asset price to borrow an item worth $50, 5.8 percent to borrow an item worth $500, and 1.9 percent to borrow an item worth $5,000. Lenders are willing to loan goods at very similar rates, as shown in Figure 1.

Figure 1: Actual and predicted rental/asset price ratios



Predicted rental/asset price ratios are estimated using a local polynomial estimator.

Rental companies often lend goods at significantly higher rental rates, which is one reason why rental markets for most shareable goods are quite small. For example, bike shops typically rent $300 to $500 bicycles for $30 to $50 a day (Citibike Resources), so the rental/asset price ratio is about 10 percent, almost twice the 5.8 to 6.4 percent that most people are willing to pay to borrow a good of that value. The gap between the ratio rental companies charge and the ratio most individuals are willing to pay and accept represents the gains from decentralized borrowing and lending.[2] I use the predicted rental/asset price ratios from the polynomial regression to assign a

[2] Many cities have recently implemented bike-sharing programs that are transforming the bicycle rental market. For example, the New York City bike share program now offers access to 6,000 bikes at hundreds of stations in Manhattan and Brooklyn. Citibike does not compete directly with shops on daily rentals. It is focused instead on providing shorter term bike rentals to facilitate commutes. For $95 a year, members borrow a bike for an unlimited number of 45 minute

value to goods actually shared on NeighborGoods. I estimate that the mean benefit of a good borrowed on NeighborGoods in my sample is $14.88. I use this estimate to assign a monetary value to self-reported peer-to-peer sharing in both the GSS and my own survey. My results are discussed in the following section.

The last task of my paper is to estimate the potential value of decentralized sharing. Most online platforms have achieved limited success so far in facilitating sharing among loosely-connected individuals. It is not yet clear how many additional transactions these platforms will facilitate, or whether they will be more successfully in getting people to share cheap or expensive goods. This makes it impossible to estimate the potential value of decentralized sharing in the same way I estimate the current value.

Instead, I use the Consumer Expenditure Survey (CES) to calculate how much households spend on different categories of shareable goods. I measure expenditures on shareable goods in the same way Salcedo *et al.* measure expenditures on household public goods. I first determine which Universal Classification Codes (UCCs) represent spending on the sort of goods that are most commonly shared on general sharing platforms, such as tools, media, gear, electronics, and toys. This leaves out items which are occasionally shared on general platforms, and more often shared on specialized platforms, such as vacation homes, lodging, private vehicles, and pets. My classification of 490 UCCs into six categories of shareable goods is listed in Appendix B.

Current spending on shareable goods provides an imperfect upper-bound for the potential value of sharing. First, the measure ignores any social costs or benefits from sharing. Even if decentralized sharing becomes routine, households cannot eliminate their expenditures on shareable goods, because sharing is limited by the utilization of shareable goods. On the other hand, not all gains from sharing will come from people borrowing items they would otherwise have purchased; some gains will come from people borrowing items they would have foregone. Nevertheless, household expenditures on shareable goods provide a useful upper-bound on the potential gains from sharing, especially for advocates who suggest that the gains from sharing are very large. The CES also provides some information about which categories of goods promise the greatest gains from sharing.

---

trips. However, if the length of the trip exceeds 45 minutes, the program charges members $2.50 for the next 30 minutes, and $9.00 for each additional 30 minutes. The daily rental/asset price ratio for Citibike would be much higher than that offered by bike shops or decentralized lenders. However, for short-term rentals, the ratio is much lower.

5. Results

Self-reported data from the GSS and my survey suggest that the current gains from sharing are at least $179 a year for 30 percent of Americans and at least $774 for 8 percent of Americans. Data from the CES shows households spend an average of $9,090 a year on shareable goods, which suggests that the potential savings from greater decentralized sharing are limited but significant. By far, the largest gains from sharing would probably come from greater utilization of privately-owned vehicles.

5.1. The current value of decentralized sharing

According to the GSS, 7 percent of Americans report lending an item of some value to someone they "didn't know very well" once a month or more. By comparison, 8 percent of my survey respondents report lending items to people they didn't know well once a month or more. This, along with the evidence presented in Table 3, suggests that my sample of NeighborGoods users is fairly representative of the US population at large, at least in respect to how often they share goods. Respondents to my survey report sharing with people they know well about five times as often as they report sharing with people they did not know well. Table 5 shows that 35 percent report lending items to people they know well, and 29 percent report borrowing items from people they know well, at least once a month.

Table 5. Frequency of sharing

	GSS sample		**NeighborGoods Sample**							
	lend to someone you didn't know well		lend to someone you didn't know well		lend to someone you knew well		borrow from someone you didn't know well		borrow from someone you knew well	
More than once a week	29	1%	2	1%	18	5%	1	0%	8	2%
Once a week	39	1%	6	2%	27	8%	3	1%	16	5%
Once a month	128	5%	15	5%	71	22%	14	4%	71	22%
At least 2 to 3 times in the past year	474	18%	41	12%	109	33%	29	9%	90	28%
Once in the past year	464	17%	66	20%	30	9%	60	19%	52	16%
Not at all in the past year	1553	58%	199	60%	74	22%	217	67%	89	27%
Total	2687	100%	329	100%	329	100%	324	100%	326	100%

Self-reported data is imperfect. First, the wording of the questions probably misses occasions when people share some valuable goods, such as car trips or lodging. Second, the question asks how often individuals borrow and lend goods, so it misses borrowing and lending by other members of the individuals' household. Third, people report lending items slightly more

often than borrowing items. While it is possible that respondents to my survey genuinely lend goods more often than they borrow them, it seems likely that they mildly exaggerate how often they lend goods or how seldom they borrow goods.[3] These three shortcomings of the data may downwardly bias my estimates of households' gains from sharing.

My survey suggests that current levels of peer-to-peer sharing are economically significant for some Americans. If the average gain from sharing is $14.88, then borrowing goods is worth at least $179 annually to 30 percent of people, and it is worth at least $774 annually to 8 percent of people. On average, respondents report borrowing 9.5 items a year and lending 14.3 items a year, which imply mean gains from sharing are $141 and $213 respectively. My estimates suggest that sharing goods is an important component of non-market cooperation. Compare the value of borrowing and lending goods to the value of time spent helping non-household children, helping non-household adults, and volunteering. The American Time Use Survey reports how much time people spend on each of these activities. I then value these forms of non-market work at $10 per hour, which is somewhat higher than Nancy Folbre's lower-bound valuation of childcare time (Folbre 2008, 121-135) and consistent with Woods Bowman's analysis of the value of volunteer time (Bowman 2009). Table 6 compares the value of sharing goods with the value of helping non-household members and formal volunteering. Gains from sharing are not quite as important as the time people spend helping each other outside the market, but they are an important form of cooperation.

Table 6. The value of sharing goods, helping non-household members, and formal volunteering

	mean incidents per year	**mean minutes per day**	**annual value***
borrowing goods	9.5		$141
lending goods	14.3		$213
helping non-hh kids		4.5	$272
helping non-hh adults		5.2	$316
formal volunteering		9.7	$588

*I assume that the mean value of sharing a good is $14.88 and that non-market work is worth $10 an hour.

Source: My survey and ATUS 2003-2012 sample means using person/day weights

[3] The data does suggest that decentralized sharing is fairly reciprocal. The correlation between annualized measures estimates of lending to anyone and borrowing from anyone is 0.58.

The internet currently facilitates a very small fraction of decentralized borrowing and lending. Among my survey respondents, all of whom are members of NeighborGoods, less than one percent of sharing occurs on that network. However, my survey results suggest that online platforms have potential. I ask users, "What are your main reasons for not borrowing more items on NeighborGoods?" Only 12 percent of respondents responded that one obstacle is, "I am uncomfortable borrowing items from people I don't know." By contrast, 66 percent of users say, "I forget to check NeighborGoods' inventory when I need something." It may take time and practice for people's norms and preferences to adapt to new online methods for sharing. My survey also finds that 72 percent of respondents think, "There are not enough NeighborGoods users in my area." This suggests that a fundamental challenge for online platforms is to build a critical mass of users in order to match borrowers with lenders as well as offline networks.

I conclude that the current value of peer-to-peer sharing is economically significant, but moderate, for some Americans. Specifically, I estimate that it is worth at least $179 annually to 30 percent of Americans and at least $774 annually to 8 percent of Americans. Although NeighborGoods facilitates a small percentage of transaction among my survey respondents, online platforms may be more successful as they mold norms and preferences and attract a critical mass of users in local areas.

5.1. The potential value of decentralized sharing

The next task for this paper is to estimate the potential gains from sharing, *if* platforms are able to facilitate high levels of sharing between strangers. I do this by calculating households' expenditures on different categories of shareable goods. As noted in Section 4, this does not provide an exact estimate of the potential gains from sharing, but it does provide an upper bound on the amount of money households could save from borrowing, rather than purchasing, different types of shareable goods. The exercise also sheds some light on what categories of goods may offer the largest gains from sharing.

The Consumer Expenditure Survey (CES) reports that households spend an average of $820 a year on tools, media, gear, electronics, toys and other goods that are typical of the items shared on platforms like NeighborGoods, Sharetribe, and Acts of Sharing. If these goods are highly underutilized, and if the social costs of sharing are zero, then households could save no more than $820 a year by borrowing these goods instead of purchasing them. It is unclear what the gains of sharing are given actual utilization rates and social costs. It may nevertheless be helpful for proponents and designers of platforms to recognize that households spend a limited amount of

money on the tools, media, gear, electronics, and toys that often clutter our homes. The largest gains from sharing may lie elsewhere.

Members of NeighborGoods, Sharetribe, and Acts of Sharing occasionally borrow and lend other types of goods, including pets, vacation homes, lodging, and private vehicles. Table 7 lists households' mean annual expenditure on each category of these goods, as well as platforms designed specifically for sharing these goods. On average, households spend $9,090 each year on all types of shareable goods. It is unclear exactly how this upper bound translates into potential gains from sharing. However, it seems reasonable to conclude that, *if* decentralized borrowing and lending becomes common, the average households' gains from sharing could exceed one thousand dollars annually.

Table 7. Household expenditures on shareable goods

Categories of spending	Mean annual expenditures	Sharing networks	Peer-to-peer markets
Tools, media, gear, etc.	$820	NeighborGoods, Acts of Sharing, Sharetribe	Snapgoods
Pets	$286	Spotwag	NA
Vacation homes	$289	HomeExchange	Airbnb
Lodging away from home	$298	CouchSurfing	Airbnb
Private vehicles (fixed costs)	$3,994	Sharetribe, Acts of Sharing	Carpooling.com, Wheelz, RelayRides, Zimride,
Private vehicles (variable costs)	$3,403		
All shareable goods	**$9,090**		

Source: Consumer Expenditure Public Use Microdata 2011 using household weights.

Pets offer a particularly striking example of the potential gains from sharing. The cover of *The Economist*'s 2013 issue depicts a "sharing economy" household renting its lawnmower for $6 a day, its surfboard for $80 a week, and its dog for $5 a walk. The dog stands out as the only good for which it seems just as plausible for the "borrower" to charge the "lender" as vice versa. Many pet owners would like help looking after their pets, especially when they are out of town. Meanwhile, many people who do not own pets would like some animal company without the full-time responsibility of being a pet owner. There are clearly gains from sharing pets, even if is unclear who should pay whom. Spotwag's solution to this problem is to set the price at zero, providing pet owners with free pet sitters, and non-owners with free pet rentals.

Table 7 shows that, by far, the largest potential gains from sharing are in transportation. Households spend an average of $7,397 a year on the fixed and variable costs associated with private vehicles. While car rental companies and taxi services provide centralized means for

sharing vehicles, annual household expenditures on car rentals and taxis are just $31 and $28 respectively. A slew of companies are attempting to facilitate greater peer-to-peer sharing. Zimride and Carpooling.com promote ride-sharing, by matching drivers and riders, providing feedback mechanisms, and helping drivers charge riders a clear fee. RelayRides and Wheelz use similar tools to create an online marketplace for peer-to-peer car rentals. It is not yet clear how successful these companies will be, but some households could probably save over a thousand dollars a year by actively sharing vehicles with peers. In this case, there are external benefits too: ridesharing and carsharing reduce demand for parking; ridesharing also reduces pollution and congestion (Gorenflo & Eskandari-Qajar 2013).

The average US household spends $9,090 a year on shareable goods that some people already borrow and lend using online platforms. This figure provides an upper bound on the potential savings from decentralized sharing, and it leads me to conclude that peer-to-peer sharing could provide over one thousand dollars in value for the typical American household. The economic gains from sharing are not limitless, as some proponents suggest, but they are significant – particularly in the context of stagnating incomes.

6. Conclusion

Economic theory recognizes both the costs and the benefits of sharing. However, these costs and benefits are not set in stone. They depend not only on technology, but also on norms and preferences that are susceptible to change. This leads me to reject the notion that current levels of sharing are necessarily efficient and argue that decentralized borrowing and lending could become much more important in the digital economy. From this perspective, I estimate the current and potential value of peer-to-peer sharing. If online sharing platforms are successful, that suggests that the average household's gains from sharing could exceed a thousand dollars annually. The largest gains arise from greater utilization of the massive fleet of privately-owned vehicles in the US.

The sharing economy is fertile ground for future economic research. One goal would be to improve upon my estimates of the value of decentralized sharing. More detailed surveys might ask subjects to list the items they share with family, friends, and neighbors. They may also place a value on carpooling and hosting guests. Qualitative research may also shed greater light on the social costs and benefits of sharing goods.

Other research might address why some people share more than others. There is some evidence that people with lower market incomes engage in greater non-market cooperation. It is

not yet clear whether poor people borrow and lend goods more often than their affluent peers. However, further research on who shares may shed light on how sharing acts as a complement and a substitute to market provisioning.

Researchers would also benefit from a deeper understanding of the returns to scale on a variety of sharing platforms. My survey reveals a widespread belief that that the greatest challenge facing some platforms is building a critical mass of users. While there are many reasons to expect significant returns to scale on these platforms, there is no data that shows this to be the case. Economists should estimate matching functions for sharing platforms similar to those they estimate for labor markets. These matching functions will vary greatly across platforms. For example, Couchsurfing helps people find hosts around the world, whereas NeighborGoods helps people find durable goods around the block. Describing these returns to scale may give designers of platforms a better idea of how to build a successful platform.

Future research might also address the possible environmental benefits of online platforms. My survey indicates that "reducing waste" is the most common motivation for participating on NeighborGoods. The internet has produced a number of institutions for sharing goods, including Craigslist, eBay, and Freecycle. National data from the EPA shows that per-capita municipal solid waste (MSW) grew steadily until 2000, when it peaked at 4.7 pounds per person per day, and then began a slow decline. Careful analysis might reveal whether new institutions for sharing goods played a role in this reduction in waste and, if so, how to build on that success it in the future.

Finally, the sharing economy opens up new opportunities to test hypotheses from behavioral economics in non-experimental settings. Big data could allow researchers to address a number of fundamental questions. How do people cooperate? Do they reward individuals who cooperate by sharing nicely? Do they punish bad actors? Do they reciprocate directly or indirectly after borrowing a good? The growth of sharing platforms may not only improve households' standard of living and reduce waste, but also provide new opportunities for researchers to observe a wide range of economic interactions.

References

Agyeman, Julian, Duncan McLaren, and Adrianne Schaefer-Borrego. 2013. Sharing cities. *Friends of the Earth Briefing*.

Akerlof, George A. 1970. The market for 'lemons': Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics*: 488-500.

Belk, Russell. 2010. Sharing. *Journal of Consumer Research* 36 (5): 715-34.

Benkler, Y. 2004. Sharing nicely: On shareable goods and the emergence of sharing as a modality of economic production. *Yale Law Journal* 114: 273.

Botsman, Rachel, and Roo Rogers. 2010. *What's mine is yours: The rise of collaborative consumption.* HarperCollins.

Bowles, S. 2006. *Microeconomics: Behavior, institutions, and evolution.* Princeton University Press.

Buchanan, J. M. 1965. An economic theory of clubs. *Economica* 32 (125): 1-14.

Citibike resources. [cited 1/29 2014]. Available from http://citibikenyc.com/resources.

Davis, James Allan, Tom William Smith, and Peter V. Marsden. 2005. *General social surveys, 1972-2004 [cumulative file].* Inter-university Consortium for Political and Social Research.

Einolf, Christopher J. 2008. Empathic concern and prosocial behaviors: A test of experimental results using survey data. *Social Science Research* 37 (4): 1267-79.

Folbre, Nancy. 2008. *Valuing children: Rethinking the economics of the family.* Harvard University Press.

Frank, Robert H. 2010. *Microeconomics and behavior*. 8th ed. New York: McGraw-Hill.

Gansky, Lisa. 2010. *The mesh: Why the future of business is sharing.* Portfolio.

Gorenflo, Neal, and Yassi Eskandari-Qajar. 2013. *Policies for sustainable cities: A sharing economy policy primer for urban leaders.* Shareable and the Sustainable Economies Law Center.

Lauterbach, D., H. Truong, T. Shah, and L. Adamic. 2009. Surfing a web of trust: Reputation and reciprocity on CouchSurfing.com. Paper presented at International Conference on Computational Science and Engineering, 2009.

Neighborgoods. [cited 8/30 2013]. Available from neighborgoods.net.

Ostrom, Elinor. 1990. *Governing the commons: The evolution of institutions for collective action.* Cambridge University Press.

Salcedo, Alejandrina, Todd Schoellman, and Michèle Tertilt. 2012. Families as roommates: Changes in US household size from 1850 to 2000. *Quantitative Economics* 3 (1): 133-75.

Sandler, Todd, and John T. Tschirhart. 1980. The economic theory of clubs: An evaluative survey. *Journal of Economic Literature* 18 (4): 1481-521.

Santos, A., N. McGuckin, H. Y. Nakamoto, D. Gray, and S. and Liss. 2011. *Summary of travel trends: 2009 national household travel survey.* US Department of Transportation, FHWA-PL-ll-022.

Schor, J. 2010. *Plenitude: The new economics of true wealth.* Penguin Press.

Steffen, Alex. Use community: Smaller footprints, cooler stuff, and more cash. 2007 [cited 8/30 2013]. Available from http://www.worldchanging.com/archives/006082.html.

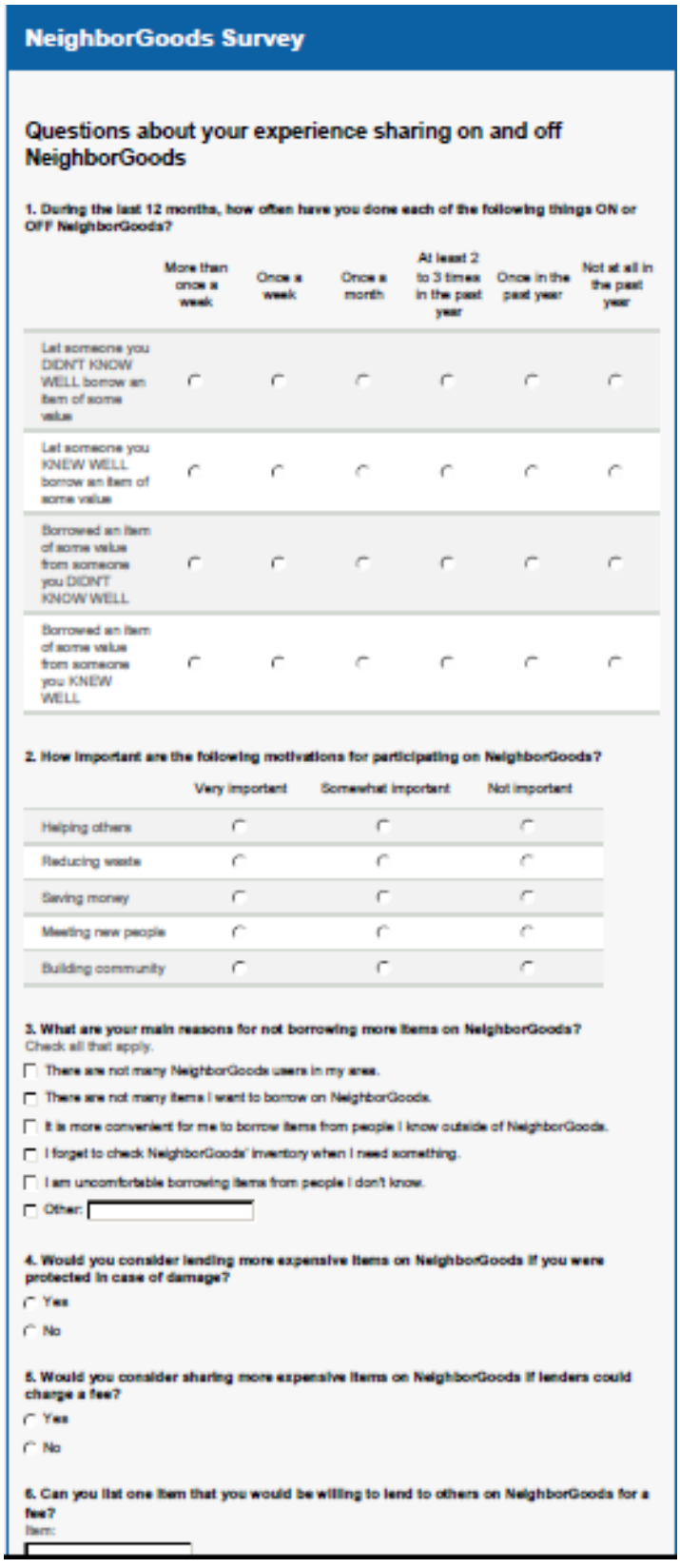
Suhonen, Emmi, Airi Lampinen, Coye Cheshire, and Judd Antin. 2010. Everyday favors: A case study of a local online gift exchange system. Unpublished.

Thomas, Valerie M. 2011. The environmental potential of reuse: An application to used books. *Sustainability Science* 6 (1): 109-16.

———. 2003. Demand and dematerialization impacts of Second-Hand markets. *Journal of Industrial Ecology* 7 (2): 65-78.

Willer, Robb, Francis J. Flynn, and Sonya Zak. 2012. Structure, identity, and solidarity: A comparative field study of generalized and direct exchange. *Administrative Science Quarterly* 57 (1): 119-55.

Appendix A



NeighborGoods Survey

Questions about your experience sharing on and off NeighborGoods

1. During the last 12 months, how often have you done each of the following things ON or OFF NeighborGoods?

	More than once a week	Once a week	Once a month	At least 2 to 3 times in the past year	Once in the past year	Not at all in the past year
Let someone you DIDN'T KNOW WELL borrow an item of some value	○	○	○	○	○	○
Let someone you KNEW WELL borrow an item of some value	○	○	○	○	○	○
Borrowed an item of some value from someone you DIDN'T KNOW WELL	○	○	○	○	○	○
Borrowed an item of some value from someone you KNEW WELL	○	○	○	○	○	○

2. How important are the following motivations for participating on NeighborGoods?

	Very important	Somewhat important	Not important
Helping others	○	○	○
Reducing waste	○	○	○
Saving money	○	○	○
Meeting new people	○	○	○
Building community	○	○	○

3. What are your main reasons for not borrowing more items on NeighborGoods?
Check all that apply.

- ☐ There are not many NeighborGoods users in my area.
- ☐ There are not many items I want to borrow on NeighborGoods.
- ☐ It is more convenient for me to borrow items from people I know outside of NeighborGoods.
- ☐ I forget to check NeighborGoods' inventory when I need something.
- ☐ I am uncomfortable borrowing items from people I don't know.
- ☐ Other:

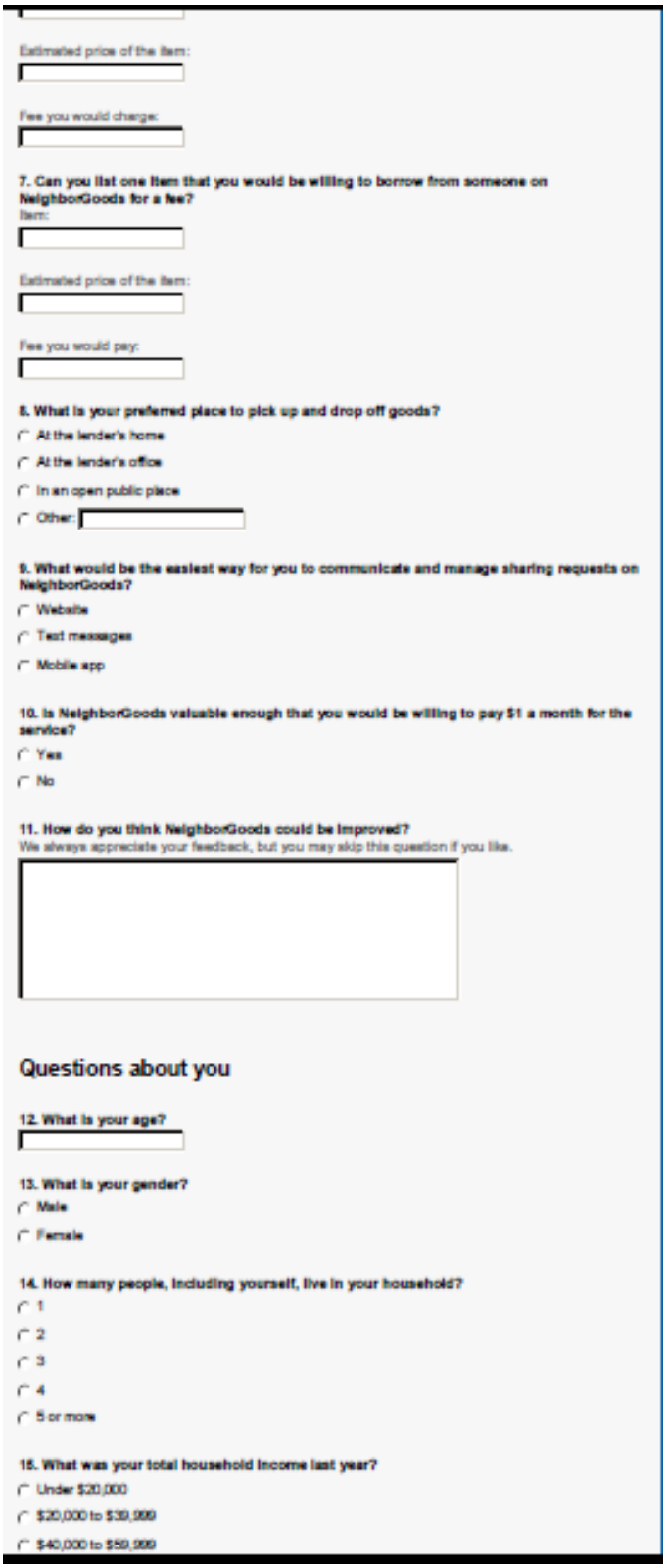
4. Would you consider lending more expensive items on NeighborGoods if you were protected in case of damage?

- ○ Yes
- ○ No

5. Would you consider sharing more expensive items on NeighborGoods if lenders could charge a fee?

- ○ Yes
- ○ No

6. Can you list one item that you would be willing to lend to others on NeighborGoods for a fee?
Item:



Estimated price of the item:

Fee you would charge:

7. Can you list one item that you would be willing to borrow from someone on NeighborGoods for a fee?
Item:

Estimated price of the item:

Fee you would pay:

8. What is your preferred place to pick up and drop off goods?

- At the lender's home
- At the lender's office
- In an open public place
- Other:

9. What would be the easiest way for you to communicate and manage sharing requests on NeighborGoods?

- Website
- Text messages
- Mobile app

10. Is NeighborGoods valuable enough that you would be willing to pay $1 a month for the service?

- Yes
- No

11. How do you think NeighborGoods could be improved?
We always appreciate your feedback, but you may skip this question if you like.

Questions about you

12. What is your age?

13. What is your gender?

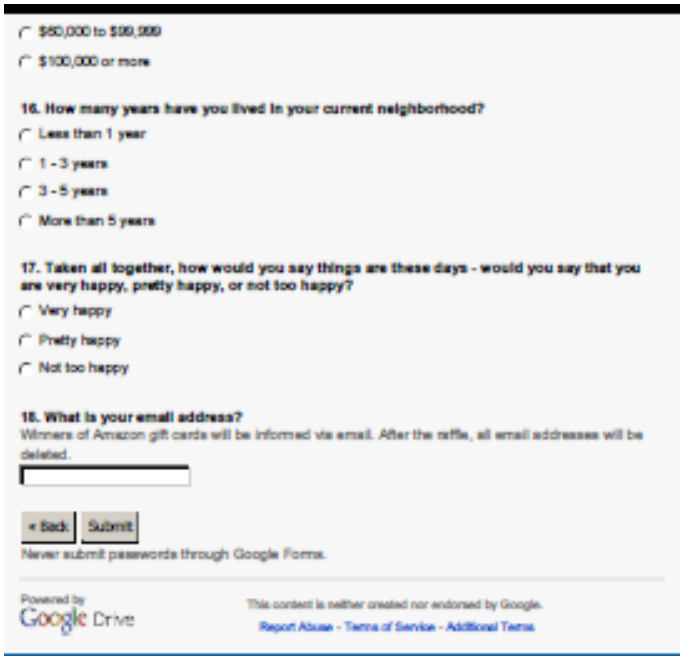
- Male
- Female

14. How many people, including yourself, live in your household?

- 1
- 2
- 3
- 4
- 5 or more

15. What was your total household income last year?

- Under $20,000
- $20,000 to $39,999
- $40,000 to $59,999



- ○ $50,000 to $99,999
- ○ $100,000 or more

16. How many years have you lived in your current neighborhood?

- ○ Less than 1 year
- ○ 1 - 3 years
- ○ 3 - 5 years
- ○ More than 5 years

17. Taken all together, how would you say things are these days - would you say that you are very happy, pretty happy, or not too happy?

- ○ Very happy
- ○ Pretty happy
- ○ Not too happy

18. What is your email address?

Winners of Amazon gift cards will be informed via email. After the raffle, all email addresses will be deleted.

« Back | Submit

Never submit passwords through Google Forms.

Powered by Google Drive

This content is neither created nor endorsed by Google.

Report Abuse - Terms of Service - Additional Terms

Appendix B

UCC	UCC description	Category of shareable good	Percent of total expen-ditures
470111	Gasoline	Private vehicles (variable costs)	6.675
500110	Vehicle insurance	Private vehicles (fixed costs)	2.432
450210	New trucks or vans (net outlay)	Private vehicles (fixed costs)	1.952
460110	Used cars (net outlay)	Private vehicles (fixed costs)	1.795
460901	Used trucks or vans (net outlay)	Private vehicles (fixed costs)	1.759
450110	New cars (net outlay)	Private vehicles (fixed costs)	1.747
210210	Lodging away from home away from home on trips	Lodging away from home	0.833
480110	Tires (new, used or recapped); replacement and mounting of tires, including tube replacement	Private vehicles (variable costs)	0.402
610320	Pets, pet supplies and medicine for Pets	Pets	0.398
220212	Same as 220211 - owned vacation home, vacation coops	Vacation homes	0.357
470113	Gasoline on out-of-town trips	Private vehicles (variable costs)	0.350
610110	Toys, games, arts, crafts, tricycles, and battery powered riders	Tools, media, gear, etc.	0.331
510901	Truck or van finance charges	Private vehicles (variable costs)	0.315
520110	Vehicle registration state/local	Private vehicles (variable costs)	0.304
620420	Veterinarian expenses for Pets	Pets	0.299
450310	Basic lease charge (car lease)	Private vehicles (fixed costs)	0.265
510110	Automobile finance charges	Private vehicles (fixed costs)	0.265
220312	Same as 220311 - owned vacation home; vacation coops	Vacation homes	0.241
490312	Lubrication and oil changes	Private vehicles (variable costs)	0.212
490413	Motor repair and replacement	Private vehicles (variable costs)	0.183
660110	School books, supplies, and equipment for college	Tools, media, gear, etc.	0.177
490221	Brake work	Private vehicles (variable costs)	0.169
450410	Basic lease charge (truck/van lease)	Private vehicles (variable costs)	0.162
490311	Motor tune-up	Private vehicles (variable costs)	0.147
490318	Repair tires and miscellaneous repair work, such as battery charge, wash, wax, repair and replacement of windshield wiper, wiper motor, heater, air conditioner, radio and antenna	Private vehicles (variable costs)	0.142
590230	Books not through book clubs	Tools, media, gear, etc.	0.128
480213	Vehicle parts, equipment, and accessories	Private vehicles (variable costs)	0.125
470112	Diesel fuel	Private vehicles (variable costs)	0.125
320410	Lawnmowing equipment and other yard machinery	Tools, media, gear, etc.	0.124
590310	Magazine or newspaper subscription	Tools, media, gear, etc.	0.117
670902	Rentals of books and equipment, and other school-related expenses	Tools, media, gear, etc.	0.108
600122	Trailer-type or other attachable-type camper (net outlay)	Tools, media, gear, etc.	0.101
490211	Clutch and transmission repair	Private vehicles (variable costs)	0.099
620410	Pet services	Pets	0.097

520531	Parking fees at garages, meters, and lots excl. fees that are costs of property ownership	Private vehicles (fixed costs)	0.095
490412	Electrical system repair	Private vehicles (variable costs)	0.084
230152	Repair and remodeling services (owned vacation)	Vacation homes	0.080
610230	Photographic equipment	Tools, media, gear, etc.	0.080
490110	Body work, painting, repair and replacement of upholstery, vinyl/convertible top, and glass, installation of carpet	Private vehicles (variable costs)	0.075
310220	Video cassettes, tapes, and discs	Tools, media, gear, etc.	0.073
320521	Small electrical kitchen appliances	Tools, media, gear, etc.	0.073
460902	Used motorcycles, motor scooters, or mopeds (net outlay)	Private vehicles (fixed costs)	0.070
600420	Hunting and fishing equipment	Tools, media, gear, etc.	0.069
490231	Steering or front end repair	Private vehicles (variable costs)	0.063
450220	New motorcycles, motor scooters, or mopeds (net outlay)	Private vehicles (fixed costs)	0.063
490232	Cooling system repair	Private vehicles (variable costs)	0.061
520512	Auto rental on out-of-town trips	rentalvehicles	0.059
490313	Front end alignment, wheel balance and rotation	Private vehicles (variable costs)	0.054
600310	Bicycles	Tools, media, gear, etc.	0.053
620912	Rental of video cassettes, tapes, and discs	Tools, media, gear, etc.	0.051
310231	Video game software	Tools, media, gear, etc.	0.051
320420	Power tools	Tools, media, gear, etc.	0.044
320511	Electric floor cleaning equipment	Tools, media, gear, etc.	0.044
310232	Video game hardware/accessories	Tools, media, gear, etc.	0.044
310230	Video and computer game hardware and software	Tools, media, gear, etc.	0.043
260113	Same as 260112 - owned vacation home; vacation condos and coops	Vacation homes	0.040
490900	Auto repair service policy	Private vehicles (variable costs)	0.039
230902	Same as 230901 - owned vacation home; vacation condos and coops	Vacation homes	0.037
490411	Exhaust system repair	Private vehicles (variable costs)	0.036
310314	Digital audio players	Tools, media, gear, etc.	0.036
590410	Magazine or newspaper, single copy	Tools, media, gear, etc.	0.035
490319	Vehicle air conditioner repair	Private vehicles (variable costs)	0.035
220122	Same as 220121 - owned vacation home, vacation coops	Vacation homes	0.035
310340	Records, CDs, audio tapes	Tools, media, gear, etc.	0.034
520410	Vehicle inspection	Private vehicles (variable costs)	0.033
320150	Barbeque grills and outdoor equipment	Tools, media, gear, etc.	0.033
600132	Boat with motor (net outlay)	Tools, media, gear, etc.	0.030
470211	Motor oil	Private vehicles (variable costs)	0.029
310210	VCR''s and video disc players	Tools, media, gear, etc.	0.028
310320	Sound components, component systems, and compact disc sound systems	Tools, media, gear, etc.	0.028
320522	Portable heating and cooling equipment	Tools, media, gear, etc.	0.027
320370	Non-electric cookware	Tools, media, gear, etc.	0.027
520310	Driver?s license	Private vehicles (fixed costs)	0.025
480212	Vehicle products and services	Private vehicles (variable costs)	0.024
340901	Rental or repair of equipment and other yard machinery, power and non-power tools	Tools, media, gear, etc.	0.023

490212	Drive shaft and rear-end repair	Private vehicles (variable costs)	0.023
450313	Cash down payment (car lease)	Private vehicles (fixed costs)	0.021
520511	Auto rental, excl. trips	rentalvehicles	0.020
430130	Travel items, including luggage, and luggage carriers	Tools, media, gear, etc.	0.019
320320	China and other dinnerware	Tools, media, gear, etc.	0.018
520532	Parking fees on out-of-town trips	Private vehicles (variable costs)	0.017
320130	Infants? equipment	Tools, media, gear, etc.	0.017
600410	Camping equipment	Tools, media, gear, etc.	0.017
600430	Winter sports equipment	Tools, media, gear, etc.	0.017
600121	Boat without motor or non camper-type trailer, such as for boat or cycle (net outlay)	Tools, media, gear, etc.	0.016
600902	Other sports equipment	Tools, media, gear, etc.	0.015
450413	Cash down payment (truck/van lease)	Private vehicles (fixed costs)	0.015
320902	Non-power tools	Tools, media, gear, etc.	0.015
490314	Shock absorber replacement	Private vehicles (variable costs)	0.015
210902	Ground rent - owned vacation home	Vacation homes	0.014
250213	Gas, bottled or tank - owned vacation home	Vacation homes	0.014
620919	Rental of other vehicles on out-of-town trips	Tools, media, gear, etc.	0.013
470220	Coolant/antifreeze, brake - transmission fluids, additives, and radiator/cooling system protectant (not purchased with tune-up)	Private vehicles (variable costs)	0.013
520550	Towing charges (excl. contracted or pre-paid)	Private vehicles (variable costs)	0.012
600901	Water sports equipment	Tools, media, gear, etc.	0.012
270413	Same as 270412 - owned vacation home; vacation condos and coops	Vacation homes	0.012
520542	Tolls on out-of-town trips	Private vehicles (variable costs)	0.012
270213	Same as 270212 - owned vacation home; vacation condos and coops	Vacation homes	0.011
450414	Termination fee (truck/van lease)	Private vehicles (variable costs)	0.009
260213	Same as 260212 - owned vacation home; vacation condos and coops	Vacation homes	0.009
590220	Books through book clubs	Tools, media, gear, etc.	0.009
520522	Truck or van rental on out-of-town trips	rentalvehicles	0.009
260114	Electricity - rented vacation property	Vacation homes	0.008
510902	Motorcycle finance charges	Private vehicles (variable costs)	0.008
320310	Plastic dinnerware	Tools, media, gear, etc.	0.007
320340	Glassware	Tools, media, gear, etc.	0.007
320512	Sewing machines	Tools, media, gear, etc.	0.007
310311	Radio	Tools, media, gear, etc.	0.007
480214	Vehicle audio equipment excluding labor	Private vehicles (variable costs)	0.006
520521	Truck or van rental, excl. trips	rentalvehicles	0.006
230142	Same as 230141 - owned home and vacation home	Vacation homes	0.005
620904	Rental and repair of musical instruments, supplies, and accessories (now includes pianos)	Tools, media, gear, etc.	0.005
880310	Interest on line of credit home equity loan - owned vacation home	Vacation homes	0.005
340907	Rental and installation of household equipment - see 300111-300332	Tools, media, gear, etc.	0.005
520560	Global positioning services	Tools, media, gear, etc.	0.005
320360	Serving pieces other than silver	Tools, media, gear, etc.	0.004

440140	Clothing rental	Tools, media, gear, etc.	0.004
390902	Girls? other clothing, incl. costumes	Tools, media, gear, etc.	0.004
380903	Women?s other clothing, incl. costumes	Tools, media, gear, etc.	0.004
450314	Termination fee (car lease)	Private vehicles (fixed costs)	0.004
480215	Vehicle video equipment	Private vehicles (variable costs)	0.004
470212	Motor oil on out-of-town trips	Private vehicles (variable costs)	0.004
250113	Same as 250112 - owned vacation home; vacation condos and coops	Vacation homes	0.003
420120	Sewing notions, patterns	Tools, media, gear, etc.	0.003
370902	Boys? other clothing, incl. costumes	Tools, media, gear, etc.	0.003
340908	Rental of office equipment for non-business use - see 320232, 690111, 690119, 690120, 690210-690230	Tools, media, gear, etc.	0.003
230123	Same as 230122 - owned vacation home; vacation condos and coops	Vacation homes	0.003
660310	Encyclopedia and other sets of reference books	Tools, media, gear, etc.	0.002
660410	School books, supplies, and equipment for vocational or technical school	Tools, media, gear, etc.	0.002
360902	Men?s other clothing, incl. costumes	Tools, media, gear, etc.	0.002
620905	Rental and repair of photographic equipment	Tools, media, gear, etc.	0.002
520907	Rental of boat or non camper-type trailer, such as for boat or cycle on out-of-town trips	Tools, media, gear, etc.	0.002
310313	Tape recorder and player	Tools, media, gear, etc.	0.001
220314	Interest on home equity loan - owned vacation home	Vacation homes	0.001
660901	School books, supplies, and equipment for day care centers and nursery schools	Tools, media, gear, etc.	0.001
600110	Outboard motor	Tools, media, gear, etc.	0.001
340902	Rental of televisions	Tools, media, gear, etc.	0.001
240323	Same as 240322 - owned vacation home	Vacation homes	0.001
240313	Same as 240312 - owned vacation home	Vacation homes	0.001
220902	Parking at owned vacation home, vacation condos and coops	Vacation homes	0.001
340905	Rental of VCR, radio, and sound equipment - see 310210, 310311-310330	Tools, media, gear, etc.	0.001
320350	Silver serving pieces	Tools, media, gear, etc.	0.001
270414	Trash and garbage collection - rented vacation property	Vacation homes	0.001
620918	Rental of video software	Tools, media, gear, etc.	0.000
620917	Rental of video hardware/accessories	Tools, media, gear, etc.	0.000
240113	Same as 240112 - owned vacation home	Vacation homes	0.000
620916	Rental of video or computer hardware or software	Tools, media, gear, etc.	0.000
620906	Rental of all boats and outboard motors	Tools, media, gear, etc.	0.000
520904	Rental of non camper-type trailer, such as for boat or cycle	Tools, media, gear, etc.	0.000
320623	Same as 320622 - owned vacation home	Vacation homes	0.000
270903	Septic tank cleaning - owned vacation home	Vacation homes	0.000
240123	Same as 240122 - owned vacation home	Vacation homes	0.000
240223	Same as 240222 - owned vacation home	Vacation homes	0.000
--	**337 UCCs that are not shareable**	**Uncategorized**	**74.566**